5-2019

Organic Chemistry I Drill (CHEM 2210D) - 1st Module - Bonding - Sample B- Answer Key

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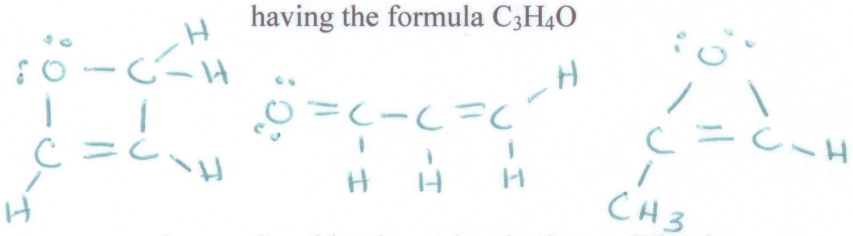
Name KEY

Organic Chemistry 2210D

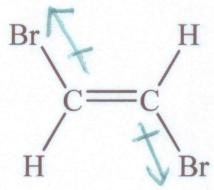
First Drill Test (Sample B)
Answer All Questions

MANY CORRECT ANSWERS!

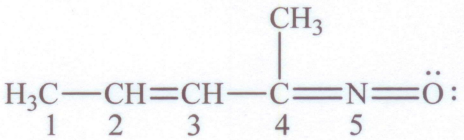
1. Draw the Lewis structure of a molecule having the formula C_3H_4O



2. Draw the bond dipoles for:



3. Consider the molecule shown. What is:



a) the hybridization of N5 sp

b) the hybridization of C2 sp^2

c) the C2-C3-C4 bond angle 120°

↑ BASED ON CENTRAL ATOM

d) the geometry of C4 TRIGONAL PLANAR

e) the formal charge on N +1

f) the formal charge on O 0

4. Give the information requested about the molecule $CH_3—CH=CH_2$.

1 2

a) Which carbon-carbon bond is the longest? 1 SINGLE > DOUBLE

b) Which carbon-carbon bond is the strongest? 2 DOUBLE > SINGLE

c) Bond 2 is composed of a σ bond made from head-to-head overlap of sp^2 orbitals and a π bond made from side-to-side overlap of p orbitals.

5. Calculate the HDI for: $\frac{2C + N + 2 - H - \text{HALOGEN}}{2}$

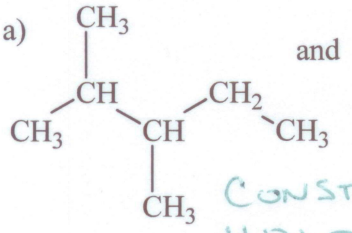
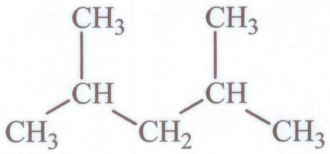
a) C_4H_9N

$\frac{2 \cdot 4 + 1 + 2 - 9}{2} = 1$

b) $C_6H_8Br_2$

$\frac{2 \cdot 6 + 2 - 8 - 2}{2} = 2$

6. What is the relationship between the structures shown below? (Possible answers: same compound, constitutional isomers, unrelated molecules) Calculate the HDI of each molecule.

a)  and 

CONSTITUTIONAL ISOMERS

HDI = 0

b) $CH_2Br\text{-}CHBr\text{-}CH_3$ and SAME $CH_3\text{-}CHBr\text{-}CH_2Br$

HDI = 0

Multiple Choice:

7. Which of these molecules is most soluble in water?

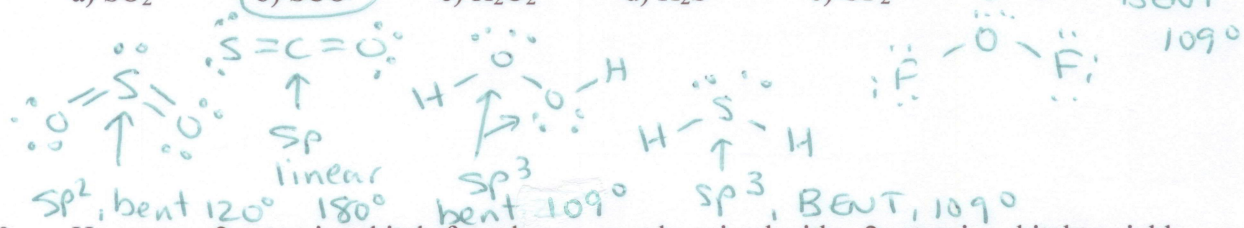
a) $CH_3CH_2CH_2CH_2CH_2OH$ (H-BONDS, #2) b) CH_3CH_2OH (H-BONDS, #1, FEWER CARBONS) c) CH_3CH_2Br (DIPOLES, #3) d) CH_3CH_3 (VDW, #4)

8. Which of these molecules has the lowest boiling point?

a) CH_3Li (IONIC, #4) b) CH_3CH_3 (VDW, #1, LOWEST) c) CH_3NH_2 (H-BONDS, #3) d) CH_3CHBr_2 (DIPOLES, #2)

9. Which of these molecules is linear? (Hint: draw a Lewis structure before you decide).

a) SO_2 b) SCO c) H_2O_2 d) H_2S e) OF_2



10. How many 2p atomic orbitals from boron must be mixed with a 2s atomic orbital to yield the bonding hybrid atomic orbitals in BF_3? (Hint: What is the hybridization of B?)

a) 1 b) 2 c) 3 d) 4 e) 5